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13. Abstract *(Maximum 200 words).*

An updating scheme for a 2-layer, finite depth, primitive equation model of the Gulf Stream region has been developed. The scheme assimilates a regularized field of sea level observations. The difference between the observation and the model solution is used to update the upper layer pressure of the model. Satellite observing systems give only information about the sea surface elevation (the upper layer pressure field of the model). Earlier studies have shown that it is important to be able to transfer this information to the lower layer in order for the model to have a realistic evolution. A statistical inference technique is used to estimate the correction to the lower layer pressure given the correction to the upper layer pressure field. In addition to updating the pressure in the two layers of the model, the velocities are updated by calculating a geostrophic correction from the changes in the pressure fields. The geostrophic correction turns out to be important for the success of the assimilation. Experiments using identical twin data as observations have been performed to determine the optimal time interval over which the observations should be assimilated into the model. The results show that the model is not very sensitive to the choice of this period. However, to ensure a smooth evolution of the model solution, the observations are assimilated over a period corresponding to about 90 time steps. Results using identical twin data as observations show that given a field of sea level observations every 6 days, the rms error between the model solution and the "observations" is reduced by 85% after 6 weeks of assimilation. A corresponding reduction in the error of the position of the Gulf Stream axis can be observed. Real satellite observations, regularized through a feature model, are now being assimilated into the numerical model.

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